Role of arbuscular mycorrhizal fungi (*Rhizophagus irregularis*) on mercury tolerance of *Medicago truncatula* in relation to mercury and zinc concentration

Yaqin Guo[1], Nadine Sommer[2], Konrad Martin[1], Frank Rasche[1]

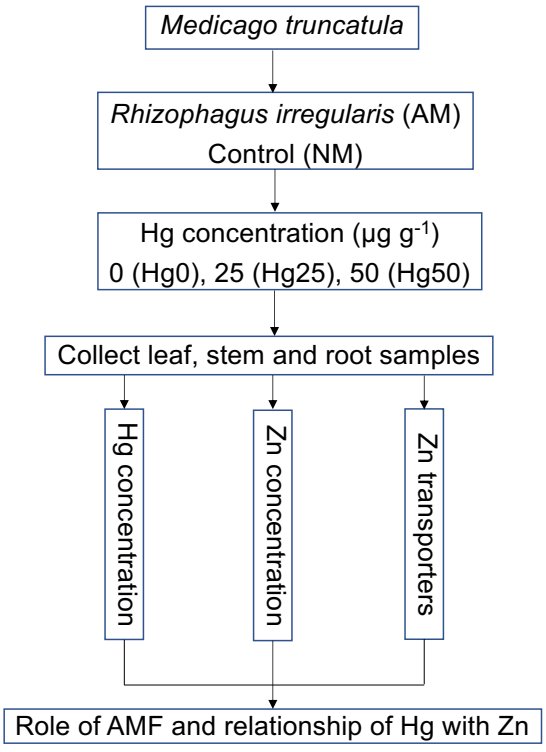
[1]Institute of Agricultural Sciences in the Tropics (Hans-Ruthenberg-Institute), Department of Agronomy in the Tropics and Subtropics, University of Hohenheim, 70593, Stuttgart, Germany

[2]Institute of Crop Science, Department of Crop Physiology of Specialty Crops, University of Hohenheim, 70593, Stuttgart, Germany

Introduction

Arbuscular mycorrhizal fungi-assisted phytoremediation to rehabilitate heavy metal contaminated soils (e.g., mercury) is a promising approach. The mechanisms, however, remain elusive, hindering the progress of field application. We conducted a greenhouse experiment to assess the response of *Medicago truncatula* to different Hg concentrations with (AM) and without (NM) inoculation of *Rhizophagus irregularis*. Additionally, zinc (Zn) uptake and the expression of two Zn transporter genes (*MtZIP2*, *MTZIP6*) were examined.

Study design



Results

1.

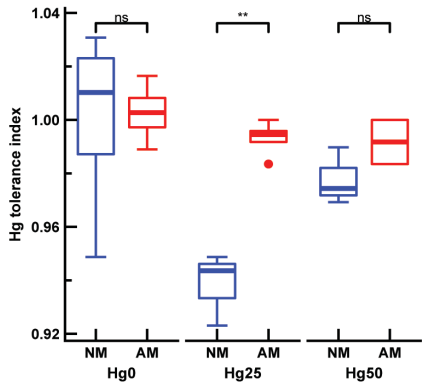
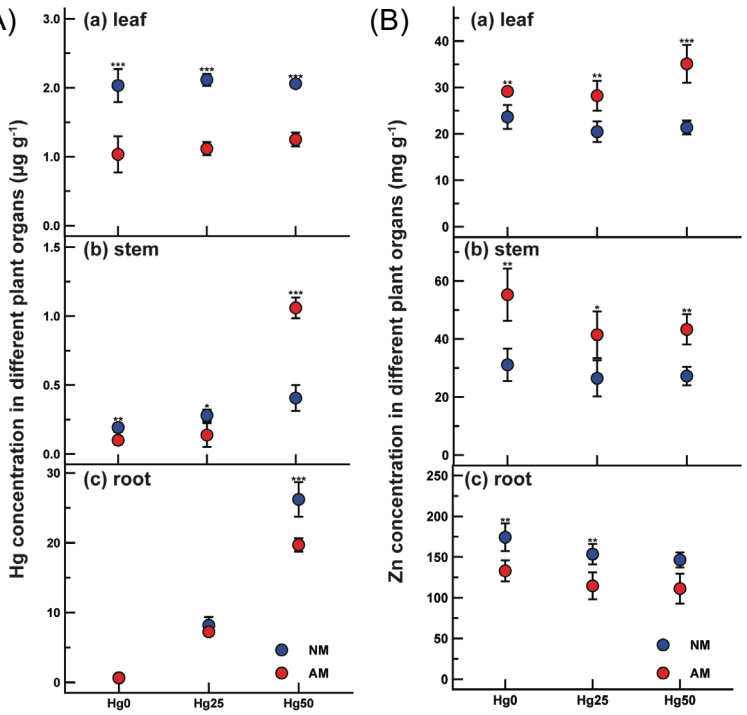


Fig.1 Hg tolerance index of plant

AM plants had higher TI than NM plants.

2. (A)



(B)

Fig.2 Hg (A) and Zn (B) concentration in different plant organs (leaf, stem and root)

AM reduced the Hg leaf uptake. At Hg25, AM reduced Hg translocation to stems. At Hg50, AM increased Hg translocation to stems.

3.

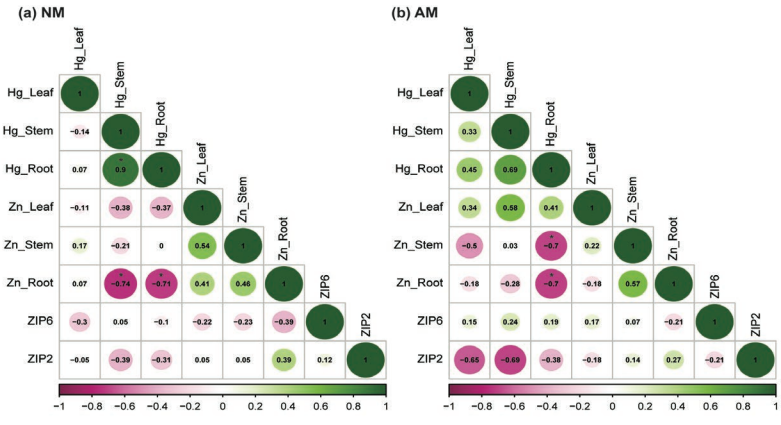


Fig.3 Correlations among measured parameters in NM and AM treatments

Hg concentration is negatively correlated with Zn concentration in NM and AM treatments.

Conclusions

The regulatory role of AMF on Hg accumulation and translocation in plants from roots to stems is dependent on the concentration of Hg in the substrate and is also influenced by other elements, as it was revealed for Zn.

Conclusively, we demonstrated that *R. irregularis* contributed to Hg tolerance of plants, suggesting the potential of *R. irregularis* for phytoremediation of Hg-contaminated sites.

E-mail: Yaqin.Guo@uni-hohenheim.de

https://doi.org/10.21203/rs.3.rs-1956869/v1